

# Radiological and Pathological Findings in Partial Nephrectomy for Renal Masses; Experience at King Hussein Medical Center

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## ABSTRACT

**Objective:** The aim of this study is to assess the accuracy of radiologic findings of renal masses by comparing them with the histopathologic diagnoses from our personal experience in partial nephrectomy specimens.

**Methods:** We reviewed the histopathological reports of 49 patients who underwent partial nephrectomy in a 10 year duration at Prince Hussein bin Abdullah urology and organ transplant centre

**Results:** Only 32 patients of 49 harbored renal cell carcinoma in their specimens with a percentage of 65.4%. The remaining 15 patients had benign renal conditions in a percentage of 30.6%

**Conclusion:** Partial nephrectomy is gold standard for small renal masses, which lead to preserve renal tissue and decrease morbidity and mortality from chronic kidney disease knowing that not all masses proved to be renal cell carcinoma. Despite the fact that renal CT-Scan with IV contrast is considered as the modality of choice for the diagnosis of renal tumors still there is a false positive rate although low but exist.

**Key words:** CT scan, Histopathology findings, Partial nephrectomy, Renal cell carcinoma.

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## Introduction

Renal masses can be detected nowadays incidentally, more commonly in completely asymptomatic patients due to wide spread use of radiological methods like Ultra sound and Computed tomography, with an incidence which exceeds 60%.<sup>(1)</sup> 85% of these masses is considered renal cell carcinoma (RCC) which is a malignant epithelial tumor of renal parenchymal origin while the remaining percentage is considered to be of benign origin.<sup>(2)</sup>

RCC ranks 10<sup>th</sup> as the cause of cancer related death with an incidence of 3%,<sup>(3)</sup> and it is the 8<sup>th</sup> most common malignant neoplasm in adults with an annual increase of 3-4% ( 1.7% for male, 2.2% for female)<sup>(1,2)</sup> as it is the 7<sup>th</sup> most common malignancy in male and the 9<sup>th</sup> in female.<sup>(1)</sup>

RCC accounts for 3% of all solid malignancies with five subtypes which are: clear cell, chromophobe, papillary (type 1 and type 2), collecting duct and unclassified;<sup>(4)</sup> while renal pelvic transitional cell carcinoma is considered rare accounting for 4% of kidney malignancies.<sup>(5)</sup>

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Benign renal lesions include renal adenoma which considered the most common one followed by oncocytoma that has a behavior which range from benign to malignant, third in frequency is angiomyolipoma and the other very rare lesions as leiomyoma, lipoma, hemangioma and juxtaglomerular tumors.<sup>(5)</sup>

The early detection and management of these tumors and the knowledge of prognostic factors had improved the survival rate in patients with renal cell carcinoma.<sup>(6)</sup>

The most sensitive imaging technique for the diagnosis is CT-Scan both unenhanced and enhanced, with the nephrographic phase to be the most accurate for detecting renal tumors.<sup>(7)</sup> While the sensitivity of CT in staging can reach 91%.<sup>(7)</sup> The degree of sensitivity of CT-Scan for detecting renal tumors is correlated with lesion size and range from 47% for small 5mm lesions up to 100% in lesions larger than 20mm in certain literatures<sup>(8)</sup>

The standard option of treatment for renal cell carcinoma is the surgical removal of the tumor.<sup>(9)</sup> This can be done nowadays by either radical or partial (nephron-sparing) nephrectomy using the method of open, laparoscopic or robotic technique with partial nephrectomy to be the gold standard.<sup>(9)</sup>

In our study we evaluated the histopathological reports of patients who underwent partial nephrectomy for a radiologically diagnosed small renal tumor in order to obtain the degree of accuracy of imaging techniques diagnosis of renal masses.

## Methods

After we obtained the approval of our medical ethical committee, the study was conducted at Prince Hussein bin Abdullah urology and organ transplantation center in cooperation with Princess Iman lab and research center for patients who underwent partial nephrectomy for renal masses in a ten year period from 2004 to 2014.

The number of patients was 49 patients 31 of which were male patients with age distribution of 33 to 78 year old, and 18 were females with an age distribution of 38 to 75 year old.

All of our 49 patients underwent open retroperitoneal partial nephrectomy through a flank incision; the procedures were done by both ischemic and non ischemic techniques with the

non ischemic technique to be related to surgeon preferences and to the small size of the exophytic renal mass, while the ischemic technique to be either warm or cold ischemia. The warm ischemia was performed by introducing a vascular clamp around the renal pedicles with an ischemia time ranges from 11-20 minutes (average 15 minutes), and the cold ischemia was obtained using crushed ice around the kidney with the use of vascular clamp around the renal pedicles with an ischemia time of 25-30 minutes (average 27 minutes). The hospital stay period was that of 4-7 days with an average of 5 days. The indication for intervention was the presence of localized exophytic or non exophytic renal mass < 5 cm but not reaching the collecting system or the presence of renal polar mass in patient with a solitary kidney.

The tumor size was in the range of 1.9 to 4.7 cm with an average of 3.3 cm. frozen section sent intraoperatively reported as margin free of tumor. The estimated operative time ranged from one to two and half hours.

The site of tumor was that of 30 patients with right sided renal mass (20 males, 10 females), and 19 patients with left side mass (11 males, 8 females).

The study was based mainly on retrospective histopathology report review of those 49 patients who all underwent partial nephrectomy for a renal mass which was diagnosed by radiological imaging techniques, specifically CT-Scan either for renal symptoms or for any other reasons as back pain or loin pain and finally diagnosed as an incidental finding of renal masses that warranted further investigations for which renal CT-Scan with IV contrast was obtained and reported as renal masses.

## Results

The results of our study regarding pathological findings in specimens obtained from patients who underwent partial nephrectomy for a renal mass diagnosed radiologically as malignant process were 32 (65.4%) patients with renal cell carcinoma (of its different subtypes), 6 (12.3%) patients with angiomyolipoma, 5(10.3%) patients with oncocytoma, 1 (2%) patient with transitional cell carcinoma, 1 (2%) patient with a simple cortical cyst, 1 (2%) patient with malakoplakia ,

**Table I:** pathological findings

Pathology	RCC	TCC	AML	Cyst	Oncocytom	Lymphangio	Malakoplakia	No or nearby
number	32	1	6	1	5	1	1	2
percentage	65.4%	2%	12.3%	2%	10.3%	2%	2%	4%

**Table II:** Distribution of renal cell carcinoma with regard to site

RCC	Male	Female
Right	15	5
Left	7	5

**Table III:** Distribution according to gender

Pathology	RCC	TCC	AML	Cyst	Oncocytoma	Lymphangioma	Malakoplakia	No or nearby
Number	32	1	6	1	5	1	1	2
Male	22	1	2	1	3	1	----	1
Female	10	----	4	---	2	----	1	1

one patient (2%) with lymphangioma, one patient(2%) no tumor in the whole specimen and finally one patient (2%) with a report of nearby tumor as the histopathologist mentioned the presence of tumor cells in the margin of the specimen but not in the specimen and so the patient warranted further evaluation by intraoperative ultrasonography.(Table I)

Of the 32 patients who had renal cell carcinoma in their specimen 22 patients were male with 15 patients of them to have the tumor in the right side and 7 in the left side. 10 females 5 of them had their tumor in the right side and 5 in the left side, with a higher incidence in the right side (20 cases) than the left (12 cases). (Table II)

Of the patients with angiomyolipoma 4 were females with a distribution of 3 cases in the right and one in the left and 2 were males with one in the right and one in the left. Oncocytoma patients were 3 males with right side lesion and 2 females with one in the right and one in the left. The transitional cell carcinoma patient was male and had his tumor in the lower pole of his right kidney. One male patient with left sided lesions had lymphangioma. The renal cyst patient was male with right partial nephrectomy. The one with malakoplakia was female with left side lesion. (Table III)

The site of nephrectomy in the whole study was 26 cases for lower pole lesion, 15 cases for upper pole lesion and only 8 cases for middle lobe lesion.

The most frequent subtype in patients who found to have renal cell carcinoma was conventional clear renal cell carcinoma 23 cases

(72%) of them 4 patients had multilocular cystic renal cell carcinoma, followed by 8 cases (25%) with papillary subtype and one (3%) with chromophobe subtype.

## Discussion

Renal masses are discovered incidentally by CT-Scan in around 50% of cases with 85% of them proved to be malignant mainly renal cell carcinoma.<sup>(10)</sup>

The most important purpose when discovering a renal mass in CT-Scan images is to differentiate wither these lesions are malignant or non malignant (benign lesions) or as non surgical and surgical lesions.<sup>(11)</sup>

Renal tumors were treated traditionally by the mean of radical nephrectomy. Partial nephrectomy was performed first with imperative indications for patients with a tumor in single functioning kidney or bilateral renal tumors in which the performance of radical nephrectomy will leave the patients anephric.<sup>(12)</sup>

Nowadays partial nephrectomy is considered the standard option of treatment for small renal tumors less or equal to 4cm<sup>(13)</sup> especially exophytic lesions<sup>(14)</sup> and also for a number of benign renal conditions.<sup>(15)</sup>

Sheth *et al* reported in their study that spiral CT-Scan is still the single most effective technique for the staging and diagnosis of renal cell carcinoma.<sup>(8)</sup>

Nikken *et al* had studied the role of MRI in the diagnosis of renal tumors and they found that CT-Scan and MRI have almost the same accuracy in

detecting most of renal lesions with the MRI proved to have better value in the evaluation of certain lesions with minimal fat component and in the evaluation of complicated cysts.<sup>(11)</sup>

Dyer *et al* in their study of CT-Scan findings in renal masses reported that some papillary renal cell carcinoma exhibit little enhancement making it difficult to differentiate them from renal cysts. Regarding angiomyolipoma they found that 5% of them which are called minimal fat angiomyolipoma have insufficient fat which will make the differentiation of them more difficult. In another cases hemorrhage within the angiomyolipoma will make the diagnosis also more difficult. Oncocytoma is considered the most commonly excised benign solid renal mass as it is difficult to be distinguished from renal cell carcinoma especially when they are small lesions.<sup>(10)</sup>

Kutikov *et al* in their study which was conducted from 1996 to 2004 on 143 patients who underwent partial nephrectomy for a solitary renal mass diagnosed as renal cell carcinoma by expert radiologist found that 16.1% of the masses proved to be benign lesions with 8 cases of them to be oncocytoma, 10 cases angiomyolipoma, 3 cases renal cysts and one case to be metanephric adenoma.<sup>(16)</sup>

In our study we evaluated the number of patients diagnosed by CT-Scan to have renal cell carcinoma and treated by partial nephrectomy and we found the percentage of 30.6% to have benign lesions in comparison with the global percentage of 16.1%

## Conclusion

Renal CT-Scan can be considered as the standard radiologic modality for the diagnosis of renal tumors despite the fact that it has certain percentage of false positive results; therefore, and it can be a guide for the resection of renal tumors by partial nephrectomy.

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